IN THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Withdrawn) A variable optical-property element, wherein a high degree of brightness is obtained and a polarizing plate is out of use.

2. (Withdrawn) A variable optical-property element according to claim 1, wherein a variable refractive-index substance causes a refractive index to have a spatially uneven distribution and optical properties of said variable optical-property element are changed by varying a distribution of said refractive index.

3. (Withdrawn) A variable optical-property element according to claim 2, wherein one of a macromolecular dispersed liquid crystal and a macromolecular stabilized liquid crystal is used as said variable refractive-index substance.

4. (Withdrawn) A variable optical-property element according to claim 2, wherein a substance in which a refractive index is periodically changed in one direction is used as said variable refractive-index substance.

5. (Withdrawn) A variable optical-property element according to claim 2, wherein a liquid crystal is used as said variable refractive-index substance and an orientation of molecules of said liquid crystal is controlled by changing a frequency of an electric field or a magnetic field.

6. (Withdrawn) A variable optical-property element according to claim 1, wherein a macromolecular stabilized liquid crystal is used.

7. (Withdrawn) A variable optical-property element using a macromolecular stabilized liquid crystal, satisfying at least one of the following conditions:

$D < \lambda / 5$

$D < 2\lambda$

$0.5 < ff' < 0.999$

$0.1 < ff' < 0.5$

where D is an average diameter of molecules of said macromolecular stabilized liquid crystal, λ is a wavelength of incident light, and ff' is a ratio in volume between said liquid crystal and said molecules.

8. (Withdrawn) A variable optical-property element using a macromolecular stabilized liquid crystal as a variable refractive-index substance, wherein a frequency of an electric field or a magnetic field is changed and thereby an orientation of molecules of said macromolecular stabilized liquid crystal is controlled.

9. (Withdrawn) A variable optical-property element using a liquid crystal in which an anisotropy of refractive index is negative, as a variable refractive-index substance, wherein a frequency of an electric field or a magnetic field is changed and thereby an orientation of molecules of said liquid crystal is controlled.

10. (Withdrawn) A variable optical-property element using a liquid crystal in which a refractive index is periodically changed in one direction, as a variable refractive-index substance, wherein a frequency of an electric field or a magnetic field is changed and thereby an orientation of molecules of said liquid crystal.

11. (Withdrawn) A variable optical-property element wherein an orientation of molecules of a variable refractive-index substance in a plane nearly perpendicular to an optical axis is substantially uniform in said plane.

12. (Withdrawn) A variable optical-property element according to claim 11, wherein a liquid crystal is used as said variable refractive-index substance and an orientation of molecules of said liquid crystal is controlled by changing a frequency of an electric field or a magnetic field.

13. (Withdrawn) A variable optical-property element according to claim 11, wherein said variable refractive-index substance whose molecules are periodically oriented satisfies the following condition:

$$0.5 \text{ nm} < S < \lambda$$

where S is a period of an orientation of said molecules and λ is a wavelength of light.

14. (Withdrawn) A variable optical-property element using photoresist exposure and etching or lithographic technology in order to make a member for controlling a direction of an arrangement or an orientation of molecules of a variable refractive-index substance.

15. (Withdrawn) A variable optical-property element having a variable refractive-index substance provided with a structure such that an electric field or a magnetic field is applied in a direction nearly perpendicular to an optical axis.

16. (Withdrawn) A variable optical-property element having a variable refractive-index substance, wherein a structure such that an electric field or a magnetic field is applied in a direction nearly parallel to an optical axis and a structure such that said electric field or said magnetic field is applied in a direction nearly perpendicular to said optical axis are provided.

17. (Withdrawn) A variable optical-property element wherein a temperature of a variable refractive-index substance is changed and thereby optical properties of said variable optical-property element are varied.

18. (Withdrawn) A variable optical-property element wherein a variable refractive-index substance in which a refractive index is periodically changed in one direction or a variable refractive-index substance with a pseudo-period is used.

19. (Withdrawn) A variable optical-property element having a variable refractive-index substance, wherein a substance in which a refractive index is changed at a period P in one direction is used as said variable refractive-index substance and said period P satisfies at least one of the following conditions:

$P \geq \lambda$

$P \geq 2\lambda$

where λ is a wavelength of light

20. (Withdrawn) A variable optical-property element having a variable refractive-index substance, wherein a substance in which a refractive index is changed at a period P in one

direction is used as said variable refractive-index substance, satisfying at least one of the following conditions:

$P \geq \lambda$

$|\Gamma / 2\Phi| < 0.11$

$|\Gamma / 2\Phi| < 1$

$|\Gamma / 2\Phi| < \pi / 6$

$|\Gamma / 2\Phi| < \pi$

$P < 20\pi \cdot \lambda \approx 62.8\lambda$

$P < 20\lambda$

$\lambda \leq P < 20\lambda$

$\lambda \leq P$ and $|\Gamma / 2\Phi| < \pi$

$2\lambda \leq P < 20\lambda$

$2\lambda \leq P$ and $|\Gamma / 2\Phi| < \pi$

$(2 / 3)\lambda \leq P < 20\lambda$

$(2 / 3)\lambda \leq P$ and $|\Gamma / 2\Phi| < \pi$

where λ is a wavelength of light, and Γ and Φ are defined as

$\Gamma = 2\pi(ne - no)d / \lambda$

$\Phi = 2\pi d / P$

where d is a thickness of said variable refractive-index substance, ne is a refractive index of said variable refractive-index relative to extraordinary light, and no is a refractive index of said variable refractive-index relative to ordinary light.

21. (Withdrawn) A variable optical-property element according to claim 20, wherein a liquid crystal whose molecules are helically oriented at said period P is used as said variable refractive-index substance.

22. (Withdrawn) A variable optical-property element according to claim 20, wherein a frequency of an electric field or a magnetic field is changed and thereby an orientation of molecules or said variable refractive-index substance is controlled.

23. (Withdrawn) A variable optical-property element according to claim 21, wherein said liquid crystal has a positive anisotropy of refractive index.

24. (Withdrawn) A variable optical-property element according to claim 23, wherein a frequency of an electric field or a magnetic field is changed and thereby an orientation of molecules of said liquid crystal is controlled.

25. (Withdrawn) A variable optical-property element shaped into a concave form, using a liquid crystal in which an anisotropy of refractive index is negative.

26. (Withdrawn) A variable optical-property element according to claim 19, wherein said variable refractive-index substance is a liquid crystal that has a property of totally reflecting light with a particular wavelength, and said particular wavelength is outside a range of wavelengths of light used for said variable optical-property element.

27. (Withdrawn) An optical system comprising:

a front lens unit including a stop and a variable optical-property element placed in the proximity of said stop, and

a rear lens unit including at least one concave surface and one convex surface, placed behind said front lens unit.

28. (Withdrawn) An optical system comprising:

a front lens unit including a stop and a variable optical-property element shaped into a concave form, placed in the proximity of said stop, and

a rear lens unit including at least one concave surface and one convex surface, placed behind said front lens unit.

29. (Withdrawn) An optical system according to claim 27, wherein at least one aspherical surface is provided.

30. (Withdrawn) An optical system according to claim 27, wherein an angle of a chief ray of light incident on an imaging surface is within a range of 90±20° with respect to said imaging surface.

31. (Withdrawn) An optical system including at least one variable focal-length lens with negative power and at least one variable focal-length lens with positive power.

32. (Withdrawn) An optical apparatus having said variable optical-property element or said optical system of the preceding claims.

33. (Withdrawn) An optical apparatus comprising:

an optical system for forming an object image, said optical system comprising a variable optical-property element;

an image sensor constructed and arranged to image said object image; and

an image processing device constructed and arranged to perform an image processing by using an image data obtained by said image sensor, said image processing device comprising a process for carrying out a process for modifying said image data in response to a change of light deflective action of said variable optical-property element.

34. (Withdrawn) A variable optical-property element according to claim 20, wherein said variable refractive-index substance is a liquid crystal that has a property of totally reflecting light with a particular wavelength, and said particular wavelength is outside a range of wavelengths of light used for said variable optical-property element.

35. (Withdrawn) An optical system according to claim 28, wherein at least one aspherical surface is provided.

36. (Withdrawn) A variable optical-property element, wherein a variable refractive-index substance having a structure of a negative anisotropy of refractive index and a period P is used, satisfying at least one of the following conditions:

$P < \lambda$

$|\Gamma / 2\Phi| << 1$

$|\Gamma / 2\Phi| < 1$

$|\Gamma / 2\Phi| < \pi / 6$

$|\Gamma / 2\Phi| < \pi$

$2\mu < d < 300\mu$

$P < 60\lambda$

$P < 20\lambda$

$P < 20\pi \cdot \lambda \approx 62.8\lambda$

$P < 20\lambda$

where λ is a wavelength of light, and Γ and Φ are defined as

$\Gamma = 2\pi(ne - no)d / \lambda$

$\Phi = 2\pi d / P$

where d is a thickness of said variable refractive-index substance, ne is a refractive index of said variable refractive-index relative to extraordinary light, and no is a refractive index of said variable refractive-index relative to ordinary light.

37. (Currently Amended) A variable optical-property mirror unit comprising:

a variable optical-property mirror comprising a rotationally asymmetric reflecting surface, a length thereof along a first direction being different from a length thereof along a second direction; and

a driving circuit constructed and arranged to drive the variable optical-property mirror,

~~wherein the variable optical-property mirror is arranged such that incident rays and emergent rays determine only one plane in which the incident rays and the emergent rays lie and that one of the first direction and the second direction coincides with a predetermined direction,~~

~~wherein the reflecting surface has a shape that defines only one plane of symmetry or no plane of symmetry, and~~

~~wherein the predetermined direction is a direction of a cross line formed where the plane in which the incident rays and the emergent rays lie intersects the reflecting surface~~

wherein the variable optical-property mirror is arranged to be decentered,

wherein the variable optical-property mirror itself is made physically changeable by the driving circuit, and

wherein the reflecting surface of the variable optical-property mirror contributes to forming a two-dimensional image.

38. (Previously Presented) A variable optical-property mirror unit according to claim 37, wherein a shape of the reflecting surface of said variable optical-property mirror unit is variable.

39. (Previously Presented) A variable optical-property mirror unit according to claim 37, wherein the light deflection property of said reflecting surface is rotationally asymmetric.

40. (Currently Amended) An optical apparatus comprising:

a variable optical-property mirror having a reflecting surface, a length thereof along a first direction being longer than a length thereof along a second direction,

~~wherein the variable optical-property mirror is arranged such that incident rays and emergent rays determine only one plane in which the incident rays and emergent rays lie and that the first direction coincides with a predetermined direction,~~

~~wherein the reflecting surface has a shape that defines only one plane of symmetry or no plane of symmetry, and~~

~~wherein the predetermined direction is a direction of a cross line formed where the plane in which the incident rays and the emergent rays lie intersects the reflecting surface~~

wherein the variable optical-property mirror is arranged to be decentered,

wherein the variable optical-property mirror itself is physically changeable, and

wherein the reflecting surface of the variable optical-property mirror contributes to forming a two-dimensional image.

41. (Currently Amended) An optical device comprising:

a variable optical-property element; and

an optical element having a plurality of rotationally asymmetric surfaces ~~and disposed in a vicinity of the variable optical-property element,~~

wherein the variable optical-property element itself is physically changeable, and

wherein the variable optical-property element contributes to forming a two-dimensional image.

42. (Previously Presented) An optical device according to claim 41, further comprising an image sensor.

43. (Currently Amended) An optical system, consisting of:

a rotationally asymmetric surface; and

a variable optical-property mirror ~~constructed with a variable shape mirror,~~

wherein the variable optical-property mirror itself is physically changeable.

44. (Cancelled)

45. (Withdrawn) An optical system, comprising:

an optical element having a rotationally asymmetric surface; and

a variable optical-property mirror unit comprising a variable optical-property mirror, an image sensor disposed at a position of an image formed by said image sensor and said variable optical-property mirror, and a holding member supporting both of said variable optical-property mirror and said image sensor.

46. (Cancelled)

47. (Cancelled)

48. (Previously Presented) An optical device according to 41, wherein each of said variable optical-property mirror and an image sensor is disposed on a surface of said optical element with a plurality of rotationally asymmetric surfaces.

49. (Currently Amended) An optical system comprising:

a variable optical-property mirror; and

an optical element disposed at the front side or the back side of the variable optical-property mirror,

wherein the variable optical-property mirror itself is physically changeable, and

wherein the optical element has a rotationally asymmetric surface having a shape that defines only one plane of symmetry or no plane of symmetry.

50. (Withdrawn) An observation apparatus comprising:

an optical element having a rotationally asymmetric surface; and

a variable optical-property mirror.

51. (Withdrawn) An observation apparatus according to claim 50, wherein said variable optical-property mirror is placed in a vicinity of said rotationally asymmetric surface.

52. (Withdrawn) An observation apparatus according to claim 50, wherein said variable optical-property mirror is disposed in a vicinity of a prism having said rotationally asymmetric surface.

53. (Withdrawn) An observation apparatus according to claim 50, further comprising a display element.

54. (Previously Presented) An optical apparatus comprising:
an image sensor and an optical element;
a supporting member for holding said image sensor and said optical element; and
another optical element disposed in a vicinity of said supporting member.

55. (Previously Presented) An optical apparatus according to claim 54, wherein said another optical element disposed in the vicinity of said supporting member has a reflecting surface.

56. (Previously Presented) An optical apparatus according to claim 54, wherein said optical apparatus comprises a variable optical-property element.

57. (Withdrawn) An optical apparatus, comprising:
an optical system having a plurality of reflecting-type variable optical-property elements and having a zooming function or a focusing function, and said variable optical-property elements being arranged on a same optical path.

58. (Withdrawn) An optical apparatus according to claim 57, further comprising an optical element.

59. (Withdrawn) An optical apparatus according to claim 57, further comprising a lens.

60. (Withdrawn) An optical apparatus according to claim 57, further comprising a display element.

61. (Withdrawn) An optical apparatus according to claim 57, further comprising a display element and an image sensor.

62. (Withdrawn) An optical apparatus according to claim 57, further comprising at least one of an infrared cutoff filter and a low-pass filter.

63. (Withdrawn) An optical apparatus according to claim 57, further comprising a stop.

64. (Withdrawn) An optical apparatus according to claim 57, further comprising a processor.

65. (Withdrawn) An optical apparatus according to claim 57, further comprising a recorder.

66. (Withdrawn) An optical apparatus according to claim 57, wherein said reflecting-type variable optical-property element is constructed with a variable shape mirror.

67. (Withdrawn) An observation apparatus. comprising:

a variable focal-length optical system comprising a reflecting-type variable optical-property element; and

a display element.

68. (Withdrawn) A display apparatus, comprising:

a variable focal-length optical system comprising a reflecting-type variable optical-property element; and

a display element.

69. (Withdrawn) An optical apparatus, comprising:

a variable focal-length optical system comprising a reflecting-type variable optical-property element;

an image sensor disposed at the position of an image formed by said variable focal-length optical system; and

a display element constructed and arranged to display an image based on an output from said image sensor.

70. (Withdrawn) An apparatus according to claim 69, further comprising an optical element.

71. (Withdrawn) An apparatus according to claim 69, further comprising a lens.

72. (Withdrawn) An imaging apparatus, comprising:

a variable focal-length optical system comprising an infrared cutoff filter or a low-pass filter and a reflecting-type variable optical-property element;

an image sensor disposed at the position of an image formed by said optical system; and

a display element constructed and arranged to display an image based on an output from said image sensor.

73. (Withdrawn) An apparatus according to claim 69, wherein a stop is disposed in said variable focal-length optical system.

74. (Withdrawn) An apparatus according to claim 69, further comprising a processor.

75. (Withdrawn) An apparatus according to claim 69, further comprising a recorder.

76. (Withdrawn) An apparatus according to claim 69, wherein said reflecting-type variable optical-property element is constructed with a variable shape mirror.

77. (Currently Amended) An optical apparatus, comprising:

an optical element; and

a ~~reflecting-type~~ plurality of variable optical-property ~~element~~ elements,

~~wherein the reflecting-type variable optical-property element has a rotationally asymmetric surface and is arranged such that incident rays and emergent rays determine only one plane in which the incident rays and emergent rays lie, and~~

~~wherein the rotationally asymmetric surface has a shape that defines only one plane of symmetry or no plane of symmetry~~

wherein the variable optical-property elements are arranged to be decentered,

wherein the variable optical-property elements themselves are physically changeable, and

wherein the variable optical-property elements contribute to forming a two-dimensional image.

78. (Previously Presented) An optical apparatus according to claim 77, further comprising an image sensor.

79. (Withdrawn) An optical apparatus comprising:
an optical element molded from a material which is plastic or glass;
an image sensor;
a display element; and
a reflecting-type variable optical-property element.

80. (Withdrawn) An optical apparatus comprising:
an optical element molded from a material which is plastic or glass;
an image sensor;
a display element: and
a reflecting-type variable optical-property element fabricated by lithography.

81. (Withdrawn) An imaging device, comprising:
an optical element having a rotationally asymmetric surface;
a variable mirror; and
an image sensor,
wherein said variable mirror and said image sensor are placed on a same substrate, and said variable mirror and said optical element constitute a whole or a part of an optical system.

82. (Withdrawn) An optical apparatus according to claim 41, wherein each of said variable optical-property mirror and an image sensor is disposed to oppose one of said plurality of rotationally asymmetric surfaces of said optical element.

83. (Withdrawn) An optical apparatus or an assembly of an optical apparatus according to claim 54, comprising a reflecting-type variable optical-property element.

84. (New) An optical device comprising:

a variable optical-property element; and

a rotationally asymmetric reflecting surface,

wherein the variable optical-property element itself is physically changeable; and

wherein the variable optical-property element and the rotationally asymmetric reflecting surface are arranged to be decentered from one another.

85. (New) An optical device according to claim 84, wherein the rotationally asymmetric reflecting surface defines only one plane of symmetry or no plane of symmetry.

86. (New) An optical device according to claim 84, wherein the variable optical-property element is a reflection-type element.

87. (New) An optical device comprising:

a variable optical-property element; and

an optical element having a plurality of rotationally asymmetric surfaces,

wherein the variable optical-property element itself is physically changeable, and

wherein the variable optical-property element forms no array.

88. (New) An optical apparatus comprising:

a variable optical-property element;

an optical element having a rotationally asymmetric reflecting surface,

wherein the rotationally asymmetric reflecting surface is arranged to be decentered,

wherein the variable optical-property element itself is physically changeable, and

wherein the rotationally asymmetric reflecting surface forms no array.

89. (New) An optical system comprising:

a variable optical-property mirror; and

an optical element arranged in at least one of a position in front of the variable optical-property mirror and a position behind the variable optical-property mirror,

wherein the variable optical-property mirror itself is physically changeable,

wherein the optical element has a rotationally asymmetric surface, and

the variable optical-property element contributes to forming of a two-dimensional image.

90. (New) An optical system comprising:

a variable optical-property mirror; and

an optical element arranged in at least in one of a position in front of the variable optical-property mirror and a position behind the variable optical-property mirror,

wherein the variable optical-property mirror itself is physically changeable,

wherein the optical element has a rotationally asymmetric surface, and

wherein the variable optical-property mirror forms no array.

91. (New) An optical apparatus comprising:

an optical element; and

a plurality of variable optical-property elements,

wherein the variable optical-property elements are arranged to be decentered,

wherein the variable optical-property elements themselves are physically changeable, and

wherein the variable optical-property elements form no array.